C4ISR Modernization

Director, Installations & Logistics (SPAWAR 04)

“Chief Installer”

What We Do (and Don't)

- **We don't build ships or ordnance.**
- **We don't build planes or missiles.**
- **We build the naval component of the joint, worldwide C4ISR system that supports naval warriors on land or sea, in the air, and in space.**

Explaining is simple & easy.

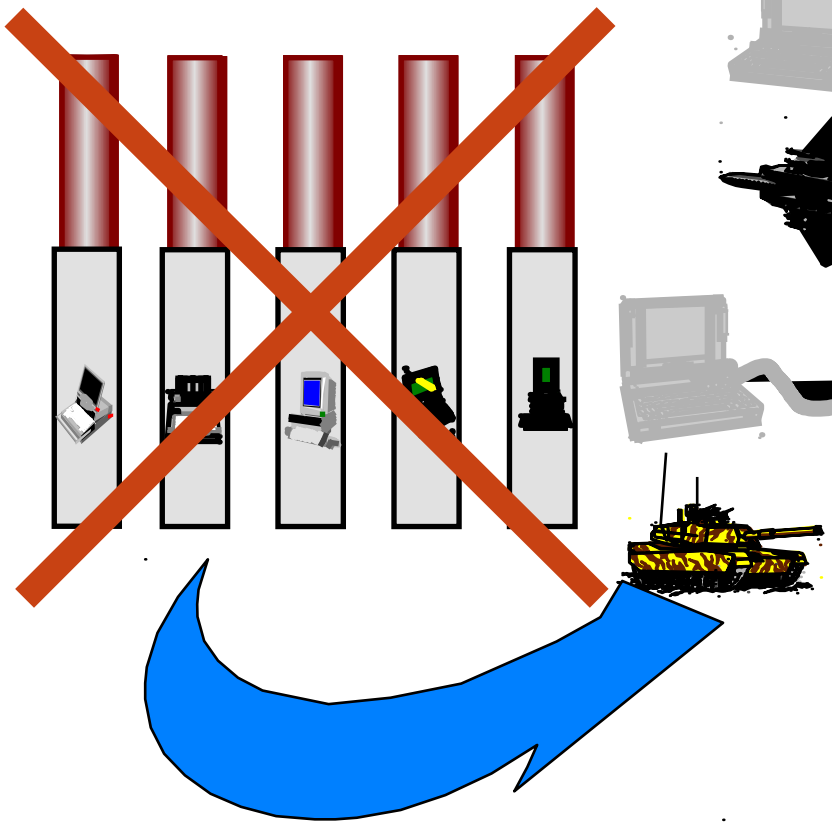
Building and delivering is complex & hard!

The Rules Have Changed

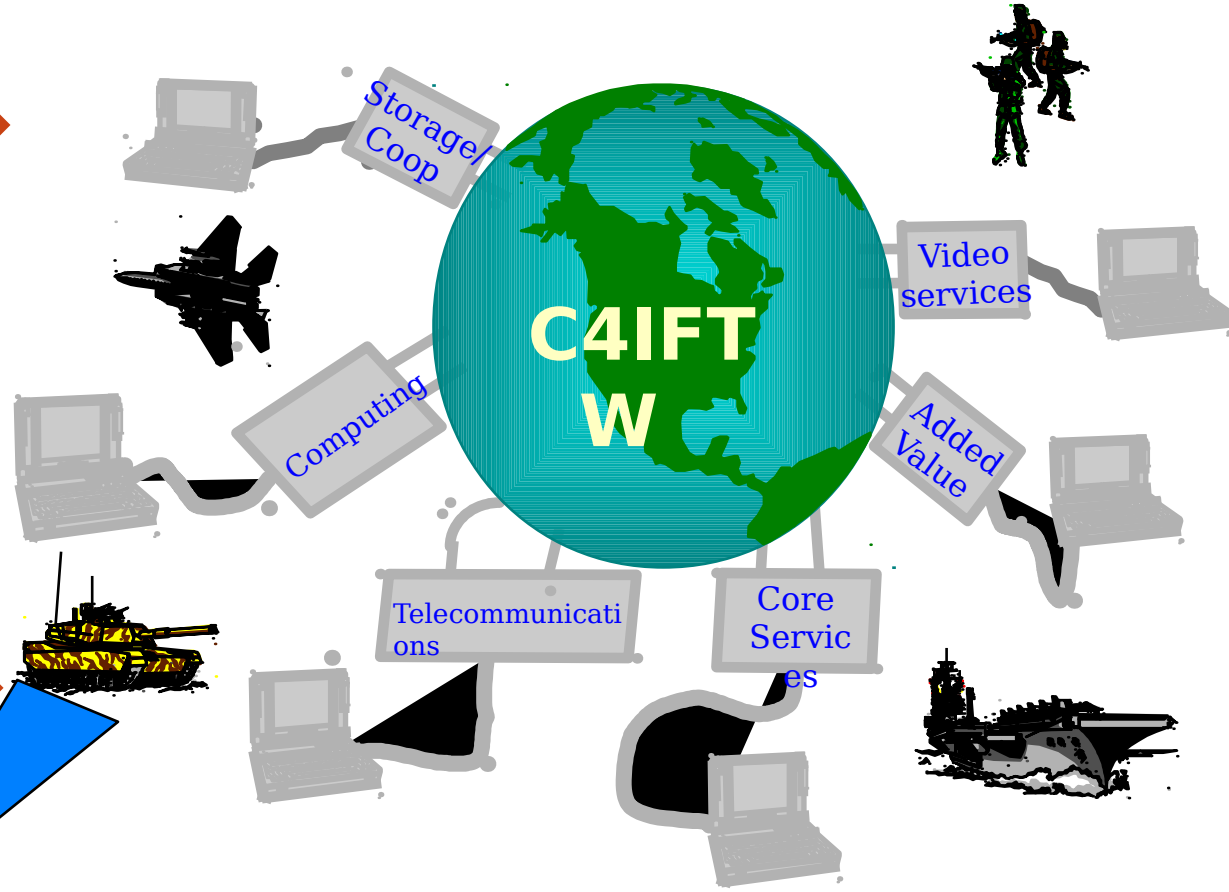
Circuits	***Networks & Services***
Platform-Centric	***Network-Info Centric***
Centralized Information, Distributed Processing	***Decentralized Informa Server-based Processi***
Customer Advoca	***Customer Involvem***

The Paradigm Shift

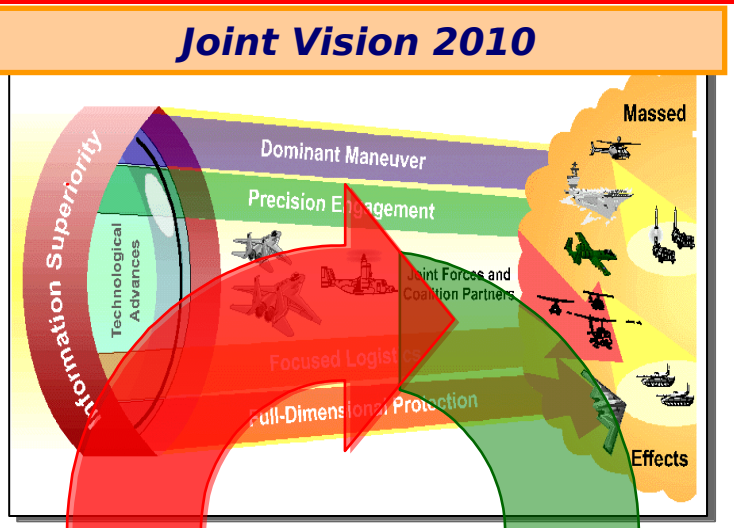
Stovepipe Systems



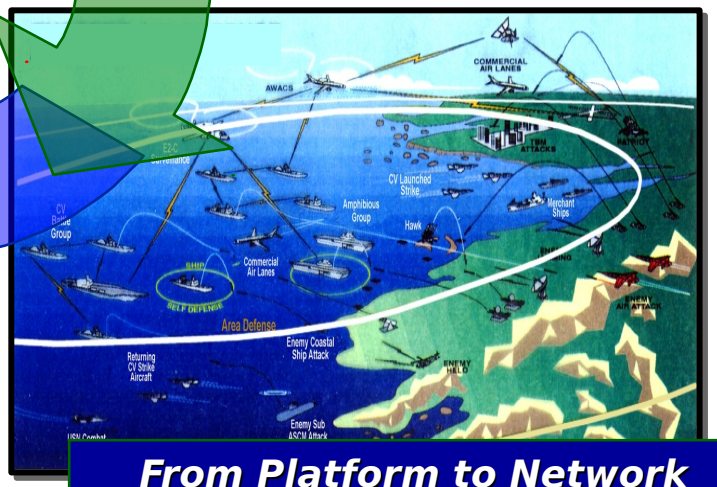
Networked Information Functions & Services



It's All Tied Together



IT-21 is the Key Enabler

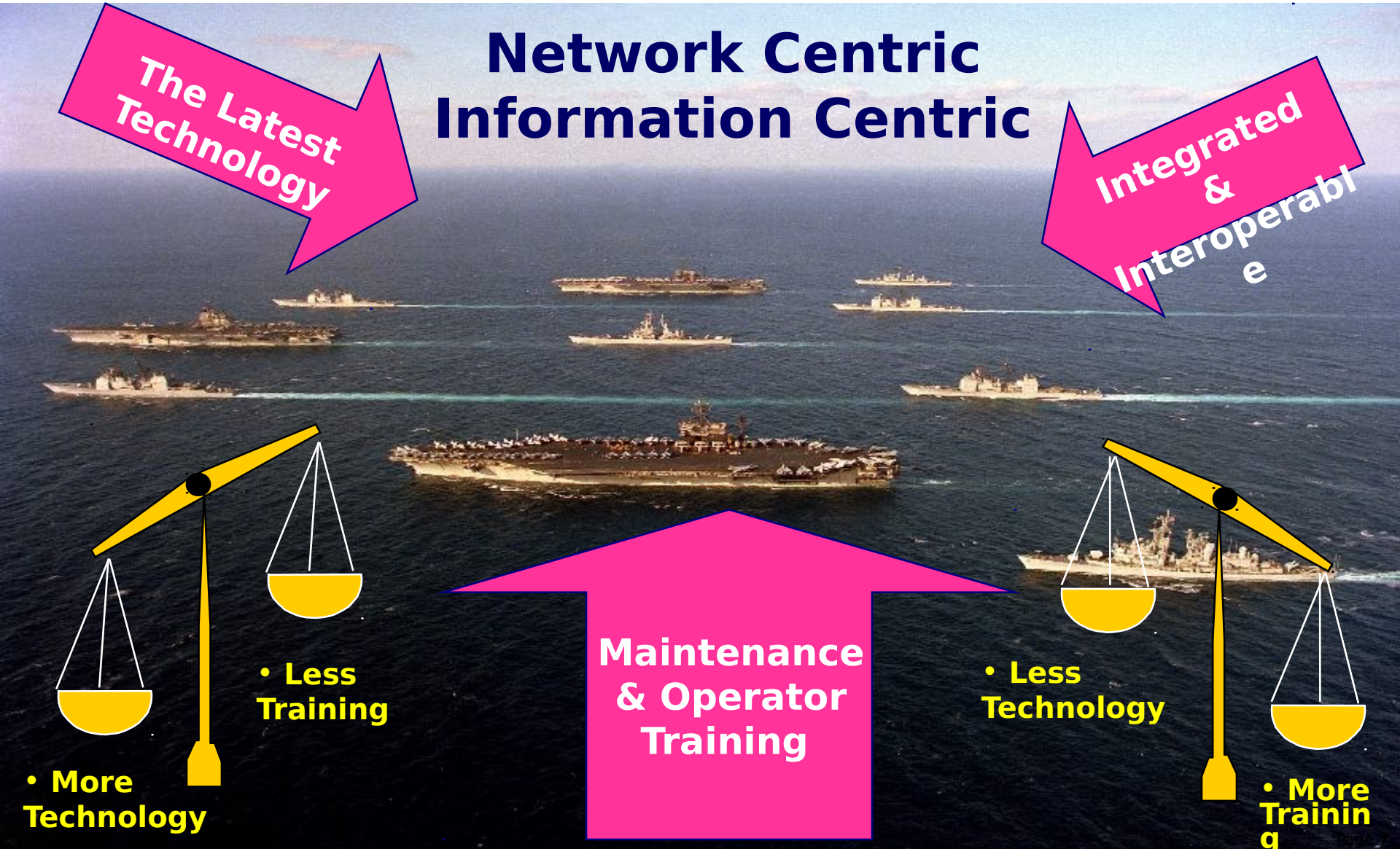


From Platform to Network Centric

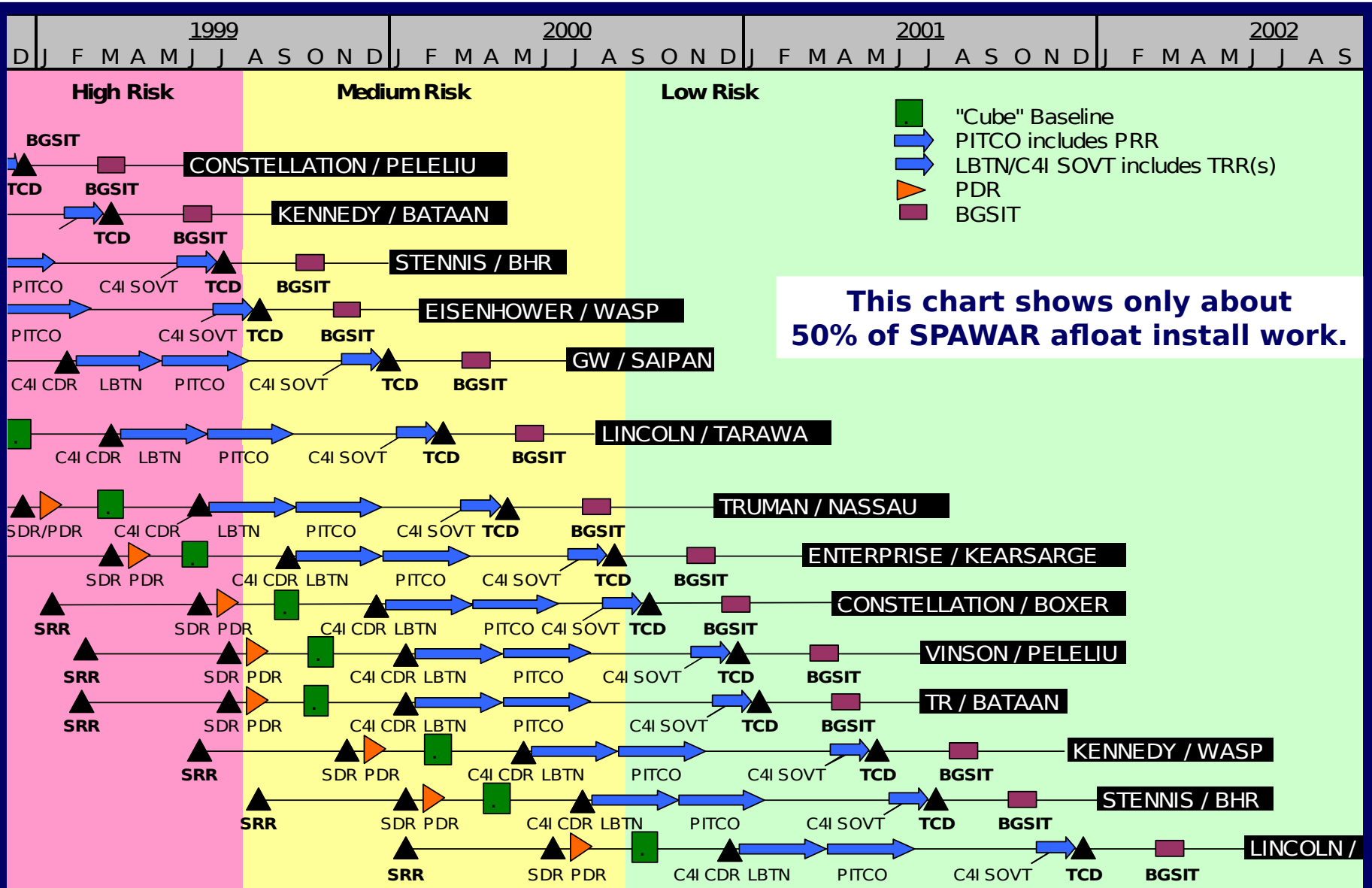
Who is the Customer?

The person using our products & services !

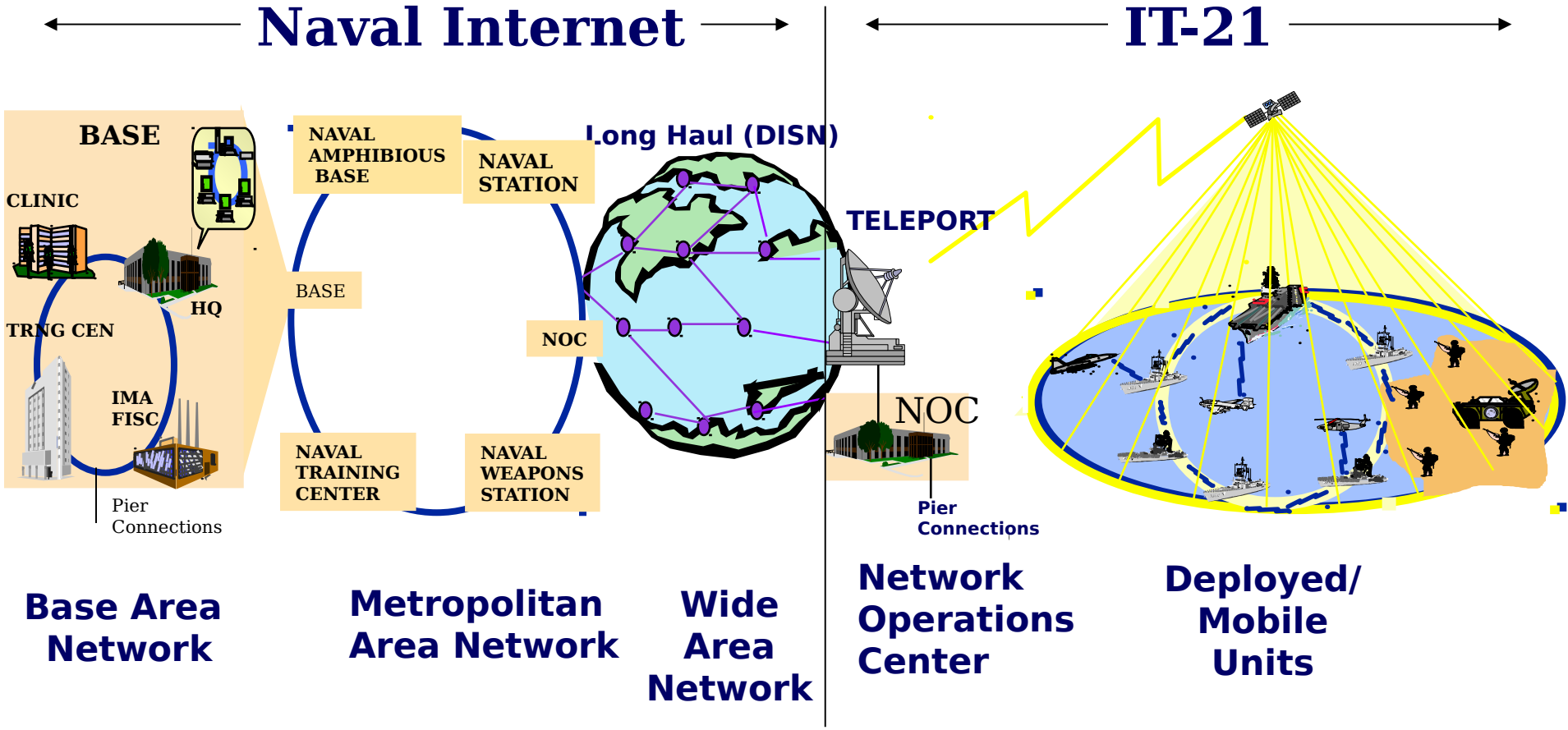
The Customer Wants



Packaged & Installed by BG/ARG

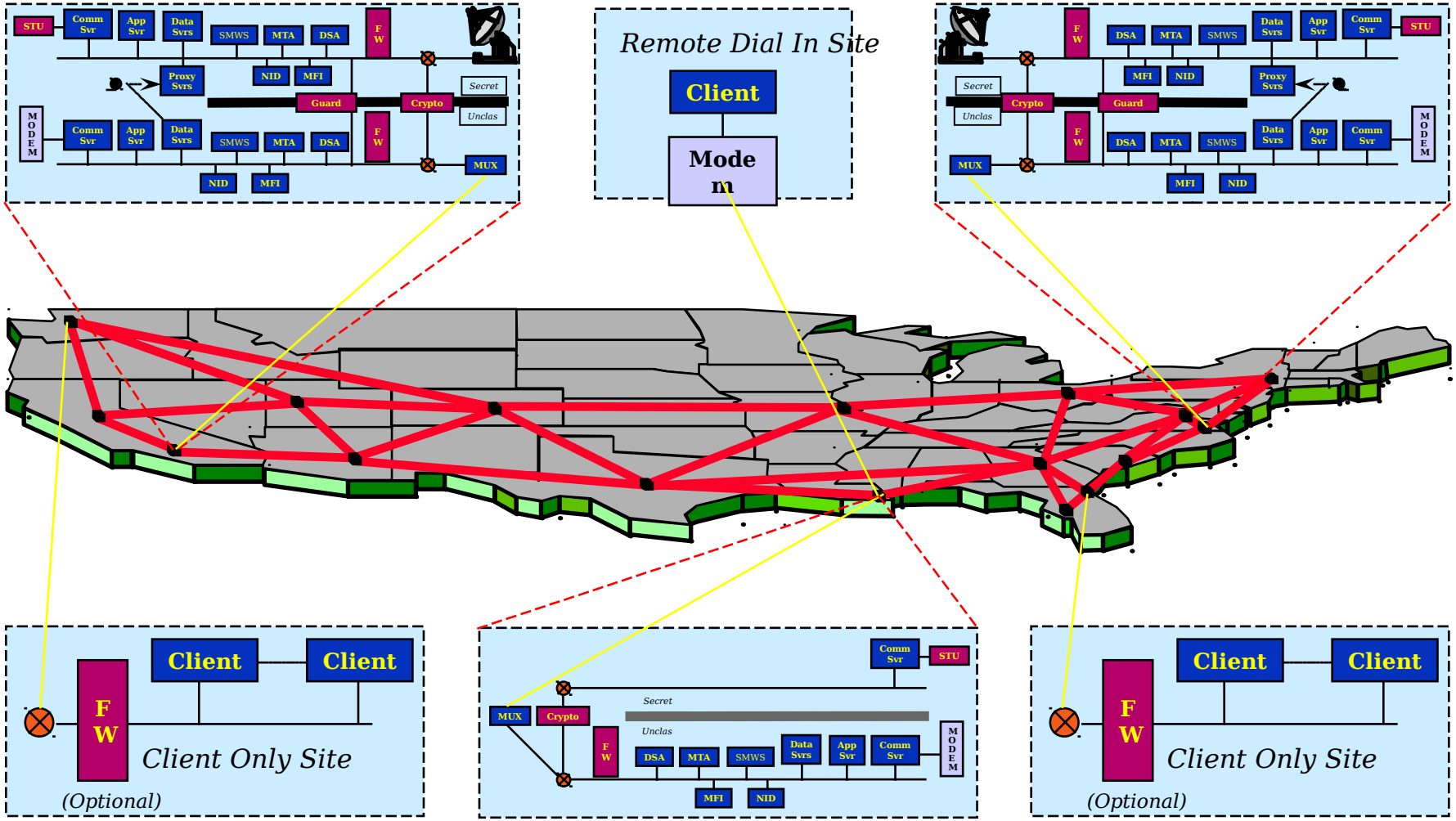


Afloat - Only Part Of The Task

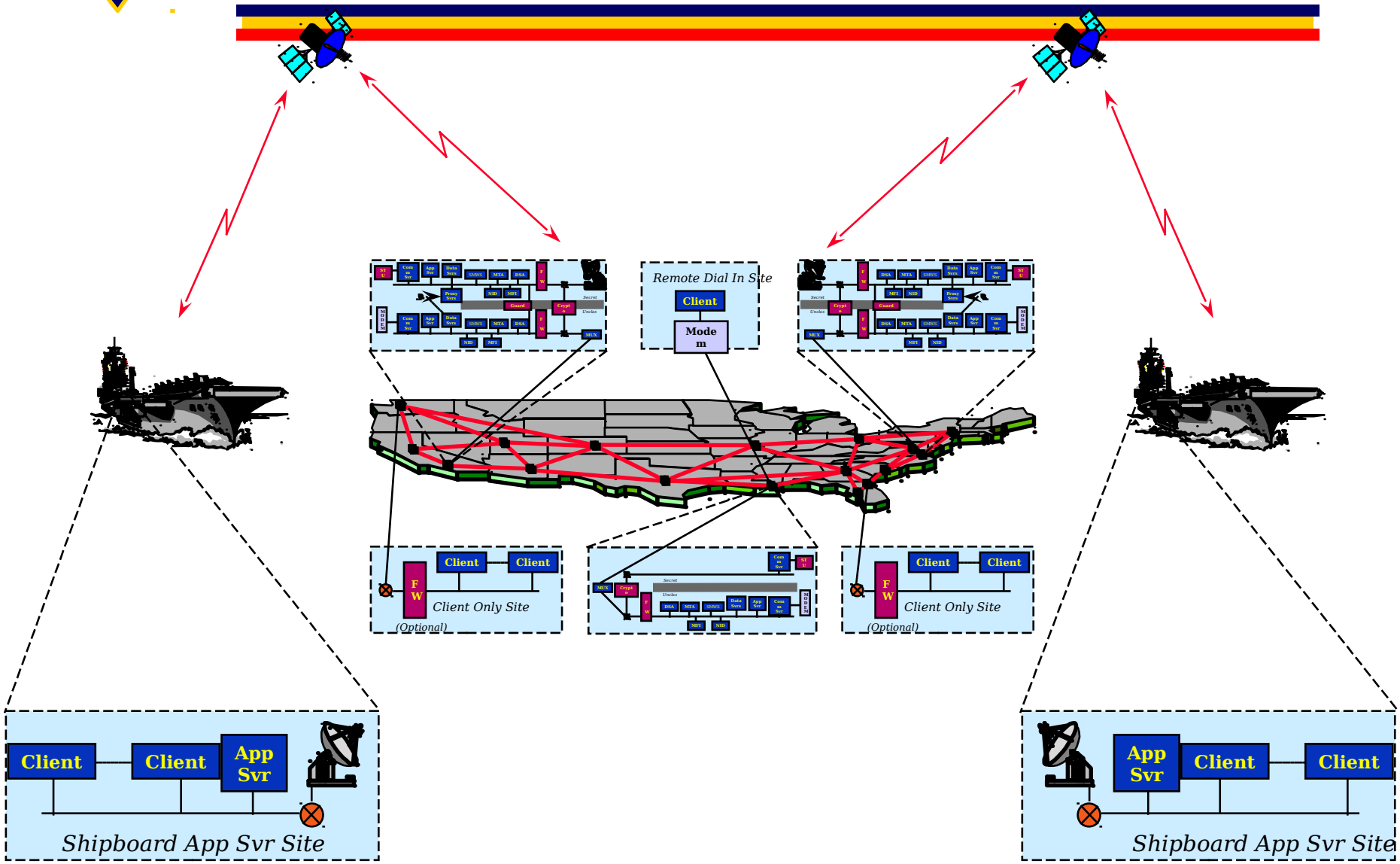


Global, Secure, End-to-End Capability

Navy-wide Internet



Extending NWI to the Fleet



Extending to the Piers

e.g., PACSOUTHWEST

	Existing Fiber (12/98)												
	Install/Mod NLT FY00												
	Future Capability												
NAVSTA San Diego (32nd St), CA													
Pier	**Ship Type**	**No. of Berths**	**Nesting**	**Ship Total**	**Ph Line Pairs**	**CATV**	**T-1**	**Nuc**	**Fiber Stations**	**Pin Sock**	**ATM/ Ether**	**Existing Fiber**	**Planned Upgrade**
1	FFG	4	x2	8	50	Yes	No	No	4	2	Yes	8mm/4sm	None
2	LHD,DDG,DD	4	No	4	50	Yes	No	No	4	2	Yes	8mm/4sm	None
3	FFG,DDG	4	x2	8	50	Yes	No	No	4	2	Yes	None	8mm/4sm
4	FFG,DDG	4	x2	8	50	Yes	No	No	4	2	Yes	None	8mm/4sm
5	FFG,DDG	4	x2	8	50	Yes	No	No	4	2	Yes	None	8mm/4sm
6 South	Sm Amphibs	2	x2	4	25	Yes	No	No	2	2	Yes	8mm/4sm	None
6 North	Sm Amphibs	2	x2	4	25	Yes	No	No	2	2	Yes	None	8mm/4sm
7	LHA, LHD,CG	4	No	4	50	Yes	No	No	4	2	Yes	8mm/4sm	None
8	CG	4	No	4	50	Yes	No	No	4	2	Yes	8mm/4sm	None
9		4	x2	8	50	Yes	No	No	1	2	Yes	8mm/4sm	None
10		4	x2	8	50	Yes	No	No	TBD	TBD	TBD	On hold	On hold
11		4	x2	8	50	Yes	No	No	TBD	TBD	TBD	On hold	On hold
12	Overflow	4	x2	8	50	Yes	No	No	TBD	TBD	TBD	On hold	On hold
13	LHD, CG	4	No	4	50	Yes	No	No	4	2	Yes	8mm/4sm	None
NAS North Island, CA													
Berths	**Ship Type**	**No. of Berths**	**Nesting**	**Ship Total**	**Ph Line Pairs**	**CATV**	**T-1**	**Nuc**	**Fiber Stations**	**Pin Sock**	**ATM/ Ether**	**Existing Fiber**	**Planned Upgrade**
Quay Wall	Surf Cbts,CVN	4	Yes, SC	4	180	Yes	No	No	4	2	Yes	8mm/4sm	None
Nuc Pier	CVN	1	No	1	120	Yes	No	Yes	3	2	Yes	12mm/12sm	None
J/K Pier	CVN	1	No	1	120	No	No	Yes				None	
Sub Base Ballast Point, CA													
Pier	**Ship Type**	**No. of Berths**	**Nesting**	**Ship Total**	**Ph Line Pairs**	**CATV**	**T-1**	**Nuc**	**Fiber Stations**	**Pin Sock**	**ATM/ Ether**	**Existing Fiber**	**Planned Upgrade**
5000	Small Subs	2	No	1	300		No		4	12	Yes	None	12mm/12sm
5002	Coronado AGF	2	x2	4	300		No		4	2	Yes	24mm/24sm	None
5003 N	Subs	1	No	1	200		No		4	12	Yes	None	12mm/12sm

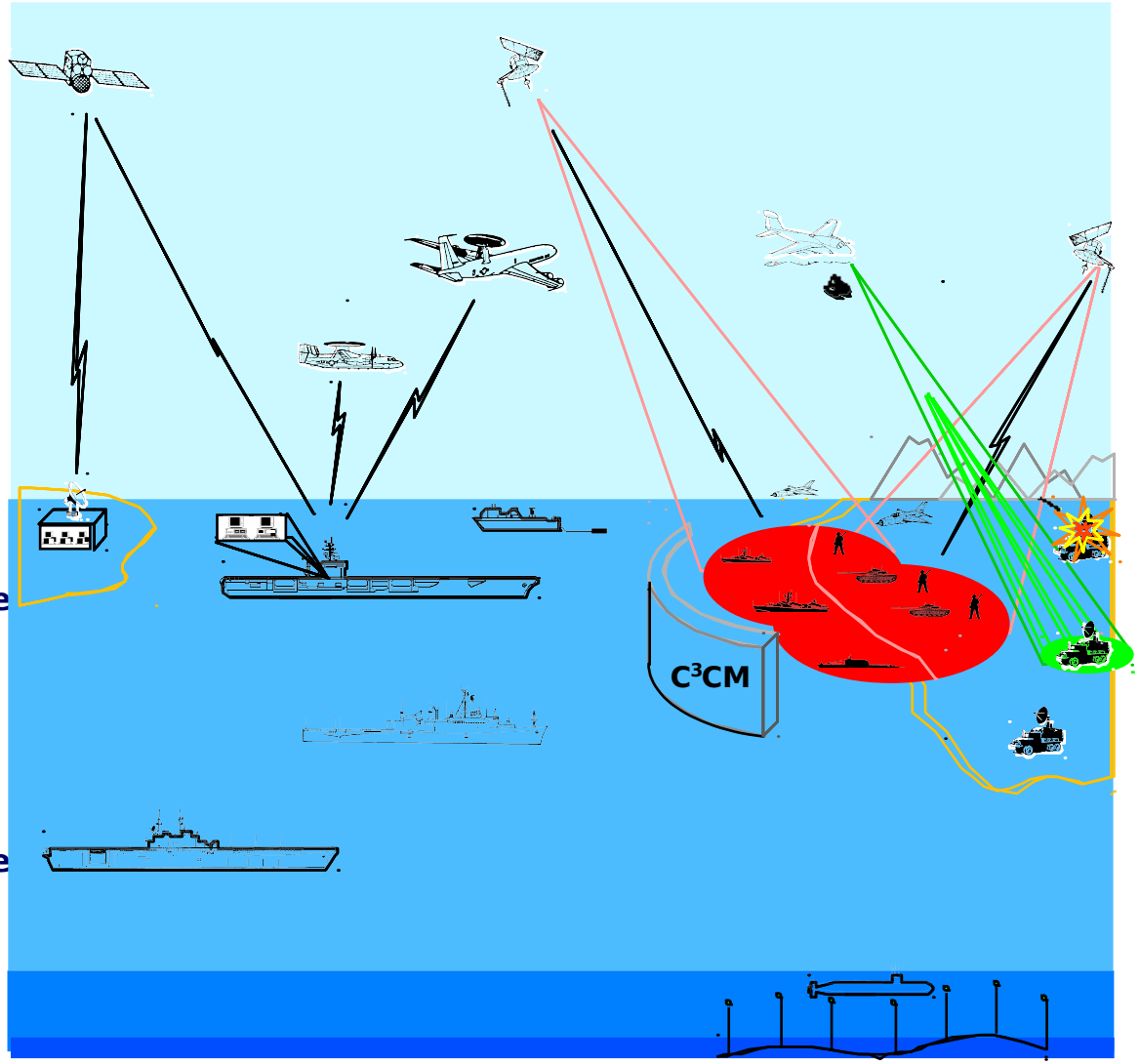
Coherent Capability Across BG/ARG Requires Synchronized Programs

Forward Deployment
- SATCOM
- INTEL Systems
- Environmental Support
- SNAP
- ASWOC
- Cryptologic & INTEL Centers
- Shorebased COMM Centers

Strategic Deterrent
- EHF/VLF
- Mobile Underse Surveillance
- SURTASS

Sealift
- SALTS
- INMARSAT
- OSS at Land Based MSC Site

Power Projection
- CSS
- OTCIXS
- TADIXS
- SHF SATCOM



Command, Control & Surveillance
- CSS/Copernicus
- OSS/NTCS-A
- Low Frequency Active
- UHF Mini/DAMA
- Precision Navigation GPS

Battlespace Dominance
- MILSTAR
- SATCOM
- JTIDS
- INFOSEC
- LFA
- CHBDL
- EHF

Force Sustainment
- COTS C4I

Crisis Response
- SATCOM

How Is Synchronization Accomplished?

- Semi-annual conference of Navy's C4ISR users, sponsors and providers (i.e., Fleet, TYCOMs, OPNAV N6 and SPAWAR/NCTC)

- Hosted by OPNAV N6; includes dedicated day for Flag level briefs/discussions

- Preceded by a "C4ISR day" between N6 & each OPNAV platform sponsors

- Confirms priority and funding levels to support delivery of end-to-end Navy C4ISR capabilities, phased by BG/ARG deployments

- Report Card to the users … (progress against plan)

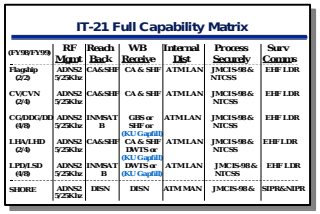
N6 Conference establishes D-16 Configuration & FY

IT-21 Capability Matrix
(Example)

(FY98/FY99)	RF Mgmt	Reach Back	WB Receive	Internal Dist	Process Securely	Comms
Flagship (2/2)	ADNS2 5/25Khz	CA&SHF	CA & SHF	ATM	LAN NTCSS	JMCIS-98 & EHF L
CV/CVN (2/4)	ADNS2 5/25Khz	CA&SHF	CA & SHF	ATM	LAN NTCSS	JMCIS-98 & EHF L
CG/DDG/DD (4/8)	ADNS2 5/25Khz	INMSAT B	GBS or SHF or (KU Gapfill)	ATM	LAN NTCSS	JMCIS-98 & EHF
LHA/LHD (2/4)	ADNS2 5/25Khz	CA&SHF	CA & SHF DWTS or (KU Gapfill)	ATM	LAN NTCSS	JMCIS-98 & EHF LD
LPD/LSD (4/8)	ADNS2 5/25Khz	INMSAT B(KU Gapfill)	DWTS or	ATM	LAN NTCSS	JMCIS-98 & EHF
SHORE	ADNS2 5/25Khz	DISN	DISN	ATM MAN	JMCIS-98	SIPR

The SPAWAR Process

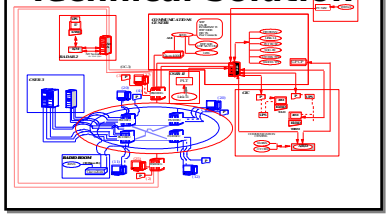
IT21 Capability Matrix



IT-21 Full Capability Matrix

(FY98/FY99)	RF Mgmt	Reach Back	WB Receive	Internal Dist	Process Security	Surv Comms
Flagship (2/2)	ADNS2 5/25Khz	CAS/SHF	CA & SHF	ATM LAN	JMCIS-98 & NTCSS	EHF LDR
CV/CVN (2/4)	ADNS2 5/25Khz	CAS/SHF	CA & SHF	ATM LAN	JMCIS-98 & NTCSS	EHF LDR
CG/DDG/DD (4/8)	ADNS2 5/25Khz	INMSAT B	GBS or SHF or (KU Cogrill)	ATM LAN	JMCIS-98 & NTCSS	EHF LDR
LHA/LHD (2/4)	ADNS2 5/25Khz	CAS/SHF	CA & SHF DWTS or (KU Cogrill)	ATM LAN	JMCIS-98 & NTCSS	EHF LDR
LPD/LSD (4/8)	ADNS2 5/25Khz	INMSAT B	DWTS or (KU Cogrill)	ATM LAN	JMCIS-98 & NTCSS	EHF LDR
SHORE	ADNS2 5/25Khz	DISN	DISN	ATM MAN	JMCIS-98 &	SIPR&NIPR

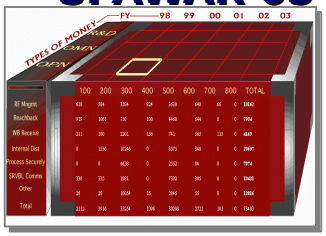
Technical Solution



Fleet's & OPNAV's Input

Operations (NOC) SPAWAR 03

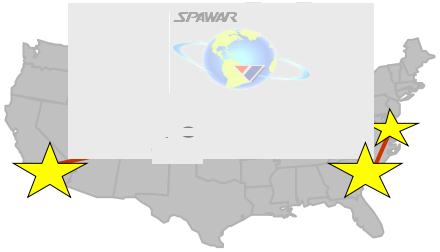
End-to-End Design (Ring Charts) SPAWAR 05



Pricing & Execution (Cube) SPAWAR 05

PMW's Products

Afloat and Ashore Installation and Logistics SPAWAR 04



SPAWAR C4ISR Systems Integration & Testing Environment

Ring Charts

- **Define & document the C4ISR configuration of every ship, region and shore activity in the Navy.**
- **Start with requirements, evolves to specific systems/”builds”**
- **Include actual and future configurations**

Provide The Right Technical Configuratio

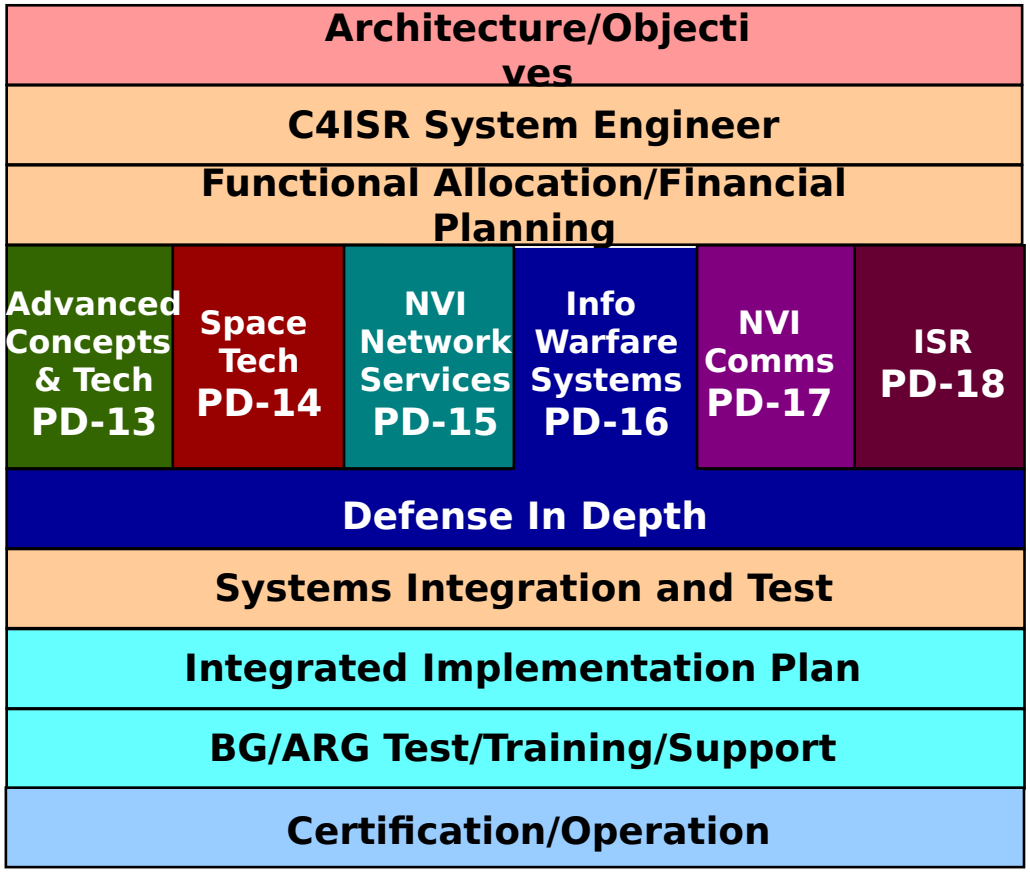
SPAWAR

The Multi-Dimensional Cube

- A process and a product
- A collaboration among: Fleet, TYCOM, BG/ARG CMDRs, N6 and SPAWAR
- Budget constrained
- Describes system requirements for end-to-end C4ISR capability for ships and stations
- Prioritized by year, type of funds, WBS, BG/ARG, etc.
- The annual spend plan and future budget plans for N6 sponsored C4ISR systems

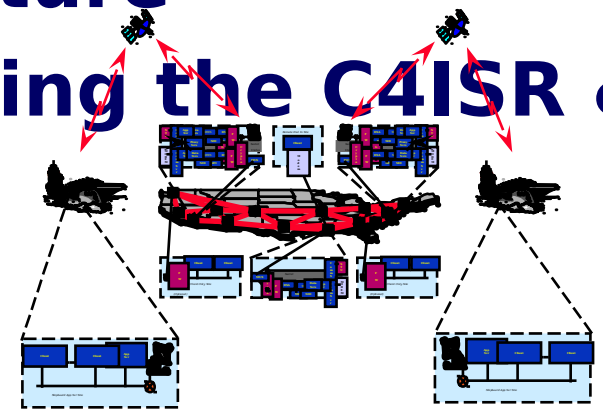
Assures end-to-end capability is delivered and supported; BG/ARG by BG/ARG

Mapping Processes to the Organization



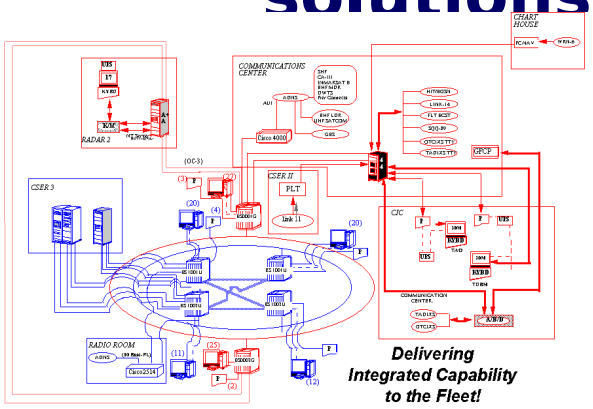
SPAWAR TD

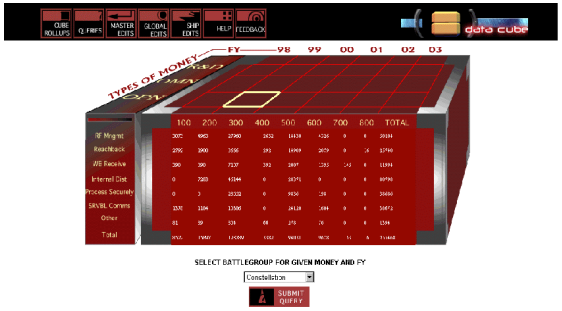
- **Provides the overall unifying direction for implementation architectures spanning all SPAWAR C4ISR efforts**
  - **Puts ISR into C4ISR**
  - **IT-21/NWI implementation architecture**
  - **Integrating the C4ISR & BMC4I worlds**

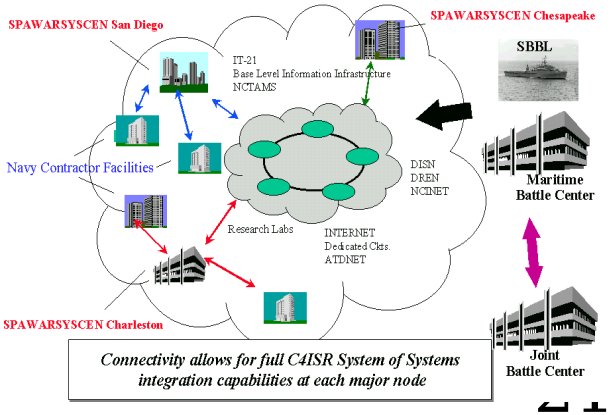


SPAWAR 05

- **Provides the overall unifying direction**
  - **SPAWAR systems design and engineering efforts**
  - **System level costing**
  - **Systems test and integration**
  - **Planning and implementing C4ISR solutions for new construction ships**

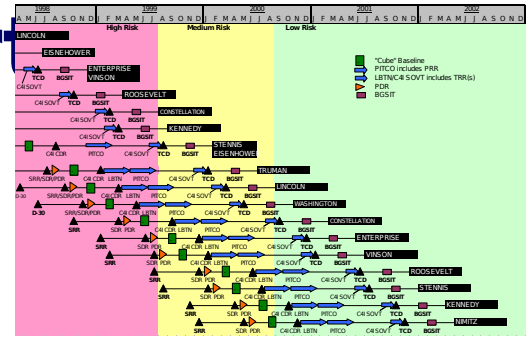


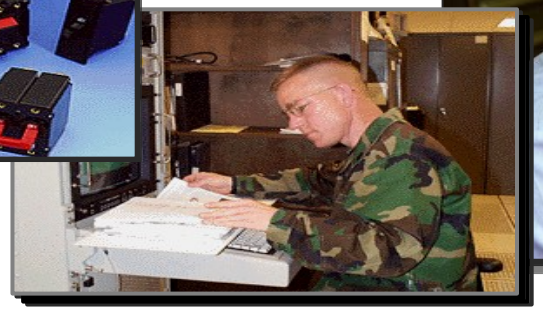


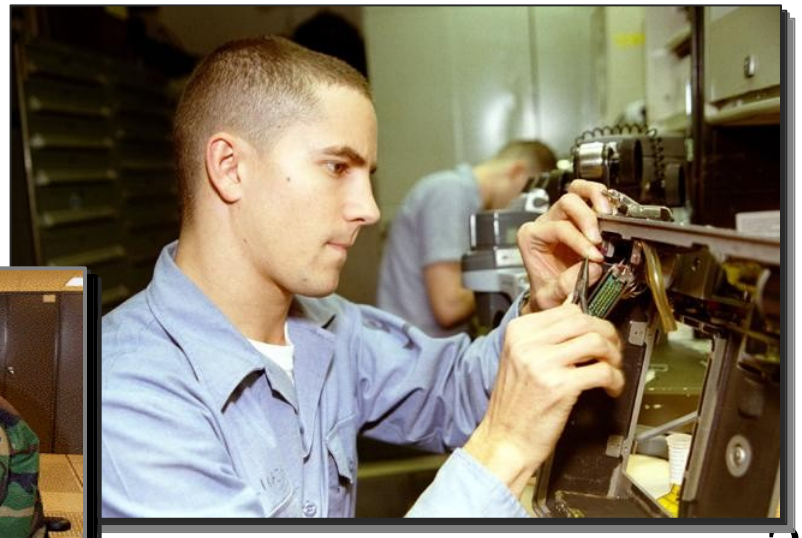


SPAWAR 04

- **Provides the unifying direction, coordination and execution of all SPAWAR installation effor**
  - **Fleet Modernization Program**
  - **Afloat and Ashore installations**
  - **Logistics engineering**



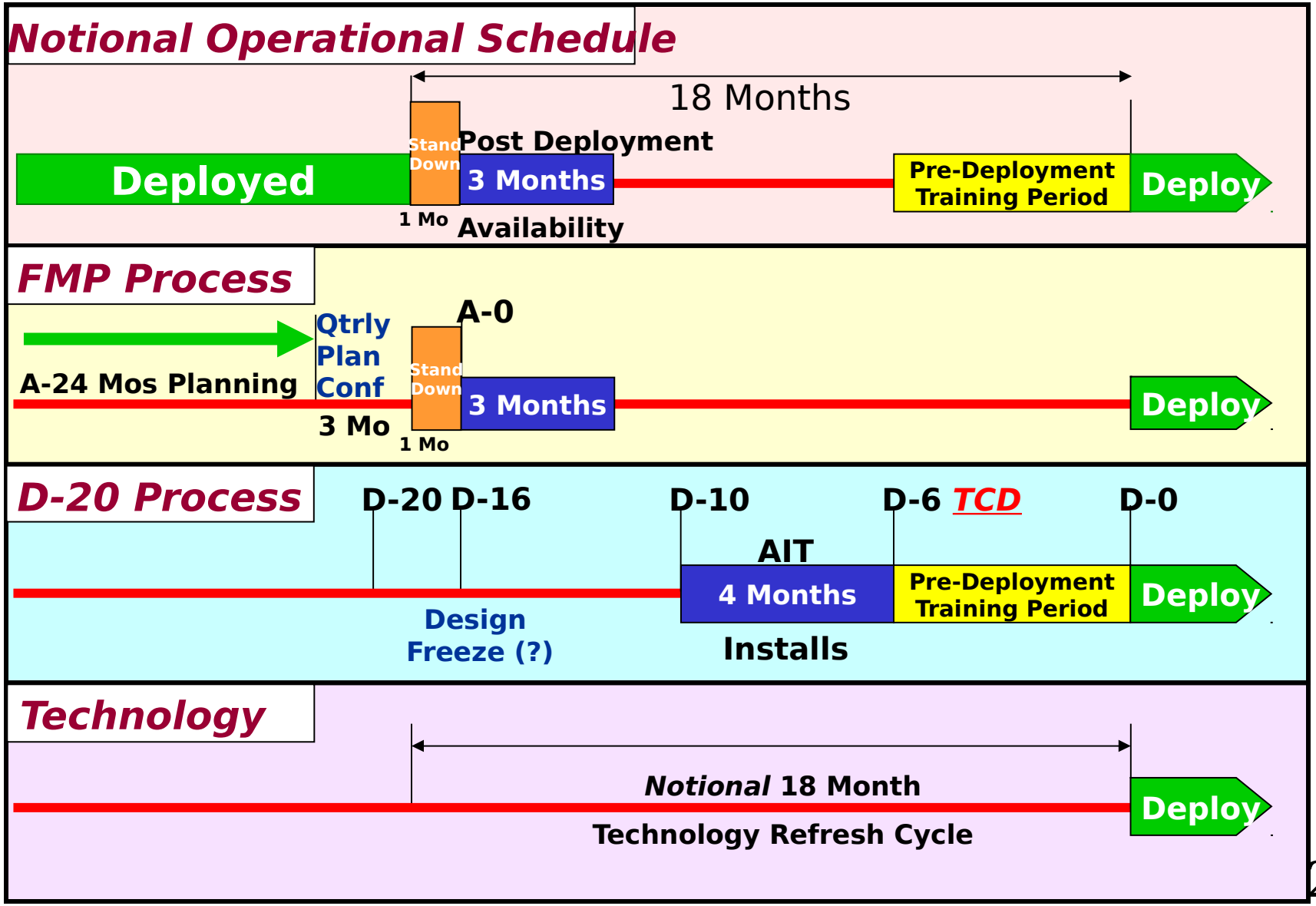




The Fleet Wants

- Newest technology C4ISR systems
- Installed with minimum impact to operational schedules
- Systems that work flawlessly, together, the first time
- Installations complete by TCD
- Top drawer customer service
- Fully trained operators and maintainers

The "Out Of Sync" Problem



Applications Development

FY 99	FY 00	FY 01	FY 02	FY 03	FY 04

4.x Software Build

- SPAWAR Apps
- Common Security Features
- DII COE level 5/7 Compliant

5.x Software Build

- Consolidate Hardware
- "Real-time" run
- Add COP features
- Coordinate with NAVSEA/NAVAIR

6.x Software Build

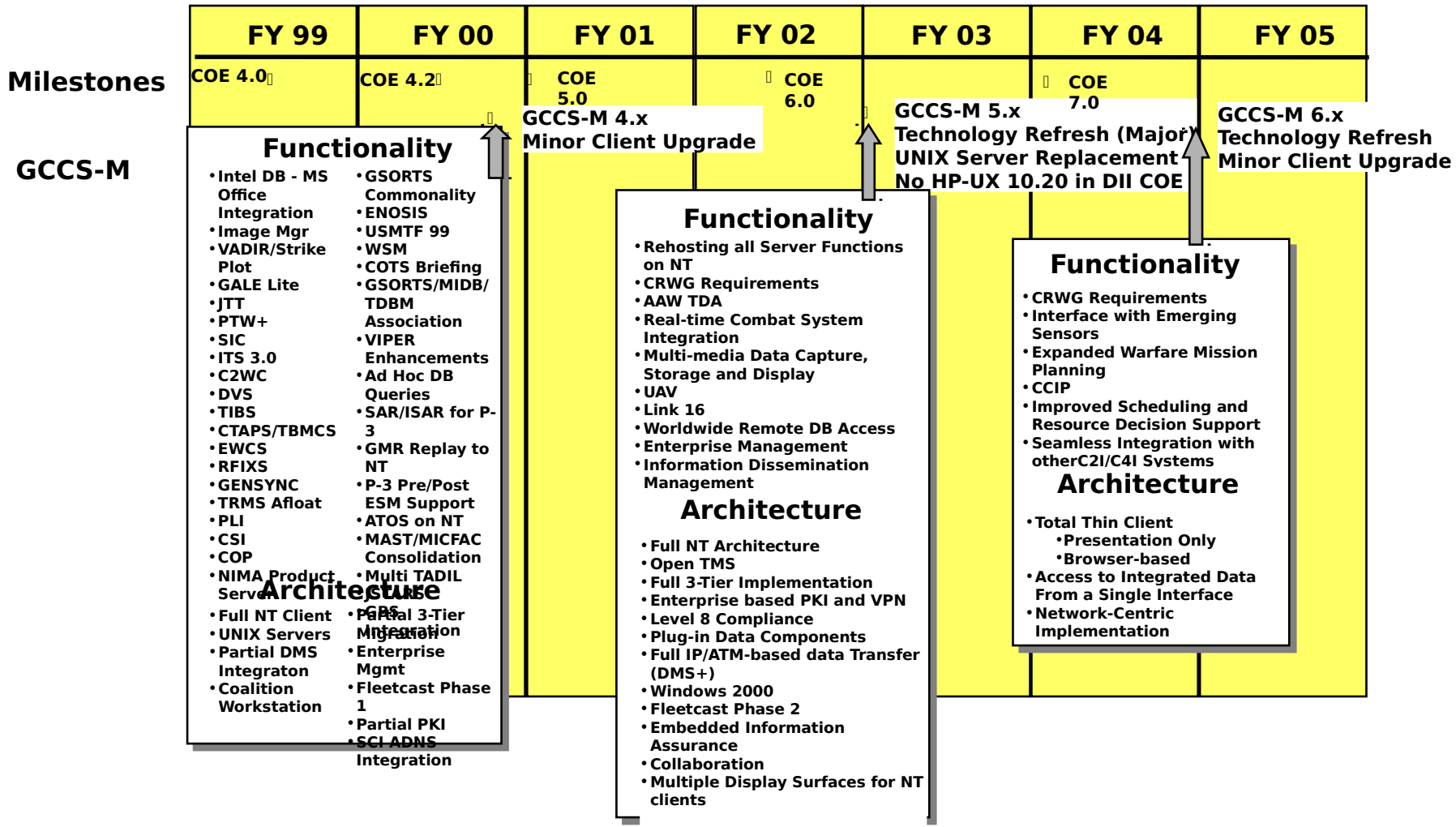
- ???
- ???
- ???

Layer 7: Applications Development

Presentation
Session
Transport
Network
Link
Physical

Other Developmental Efforts . . .

Detailed Applications Work



Network Development

FY 99	FY 00	FY 01	FY 02	FY 03	FY 04

Layer 2-4 : Network Development

4.x Build

APPLICATION SUPPORT

- IP Multicast Routing
- Multicast Flow Control
- Dynamic Multicast Addressing
- Bandwidth Reservation
- User/Application Prioritization
- Load Balancing
- Broadcast/EMCON
- Improved Subnet Protocols
- DMS/SMS/Messaging
- COP

DERIVED REQMTS ARCH CONSTRAINTS

- DII COE 5/7
- IP Voice, Video, Data
- Integrated Network Management
- EMS Integration
- Storage Area Networks (NT)
- NT/UNIX Server Consolidation
- Router Consolidation
- Solaris
- PKI
- Embarkable LAN/WAN Support
- Coalition LAN/WAN Support
- GENSER Top Secret Network

COMMS SUPPORT

- Asymmetric Support
- GBS Support
- DWTS Support
- SINCGARS Support
- JMINI Support
- EHF MDR Support

5.x Build

APPLICATION SUPPORT

- IXS Transition
- BGP4 Multihome
- MPOA/MPLS
- Wireless ATM
- Voice over ATM (LSCES)
- TACLANE/FASTLANE
- ATM Firewalls
- Secure PNNI
- Radiant Mercury IP
- Collaborative Planning Tools

DERIVED REQMTS

- Storage Area Networks
- Asymmetric Routing
- Inverse Multiplexing
- Land Line Trunking 2

6.x Build

- ???
- ???
- ???

Physical Link Development

Layer 1-2: Physical Link Development

FY 99	FY 00	FY 01	FY 02	FY 03	FY 04

STM (4.x) DMR Build

- UHF SATCOM
- Embedded Cyrpto (KGV-10,11)
- UHF LOS (w/HQ I/II)
- VHF LOS (w/SINCGARS)
- No bigger pipes

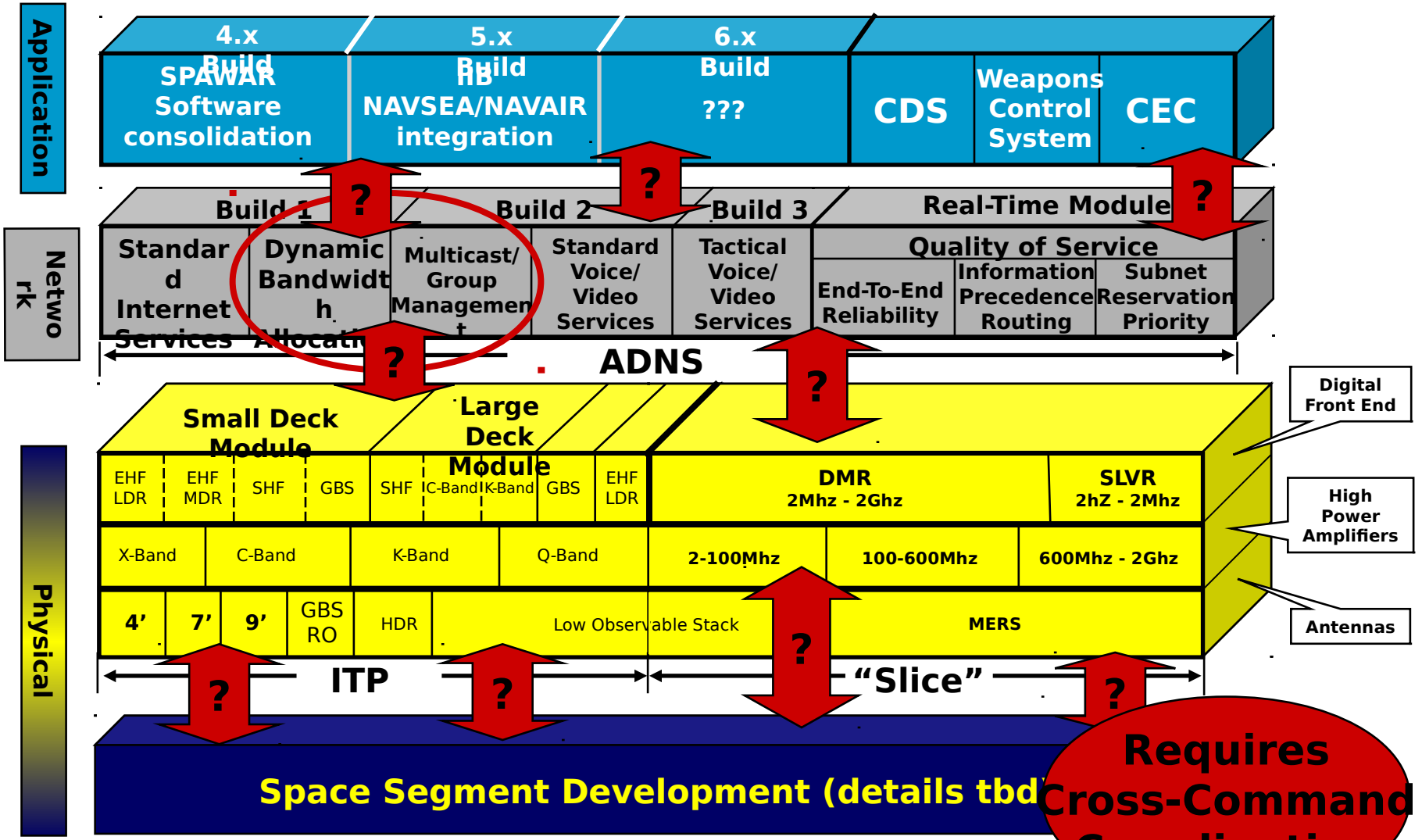
FRP (5.x) DMR Build

- HF
- UHF SATCOM (w/ADW)
- Data Link Options (UHF Link-11/4A) (HF Link-11/4A)
- VHF LOS (w/SINCGARS SIP)
- Embedded Crypto more options
- Bigger pipes if UHF HTR LOS

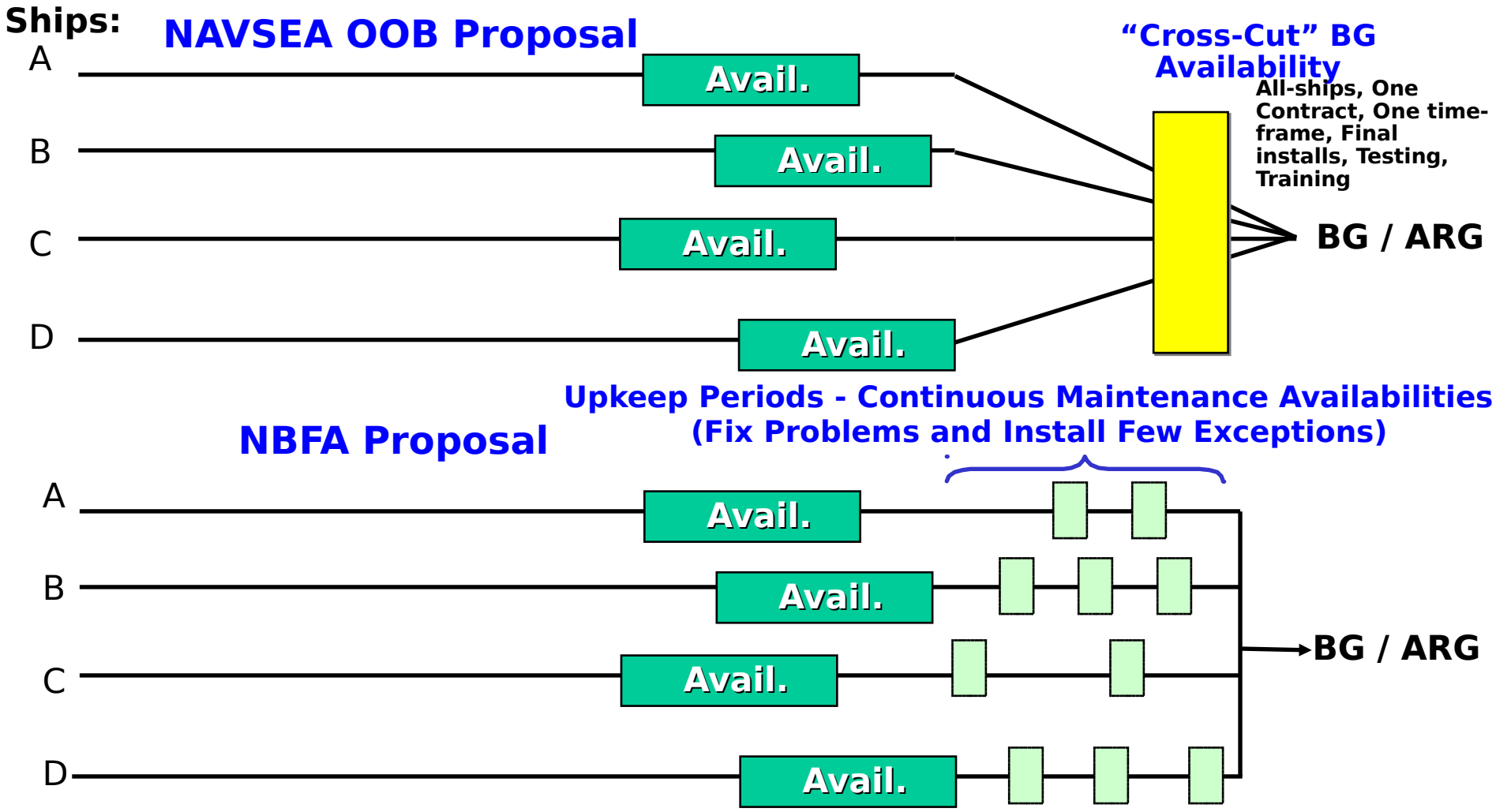
JTRS (6.x) DMR Build

- JTT
- CTT
- TRAP
- TIBS
- TRIXS
- TADIXS-B
- PCS
- EPLRS
- Link 22
- DWTS
- TADIL A
- TADIL C

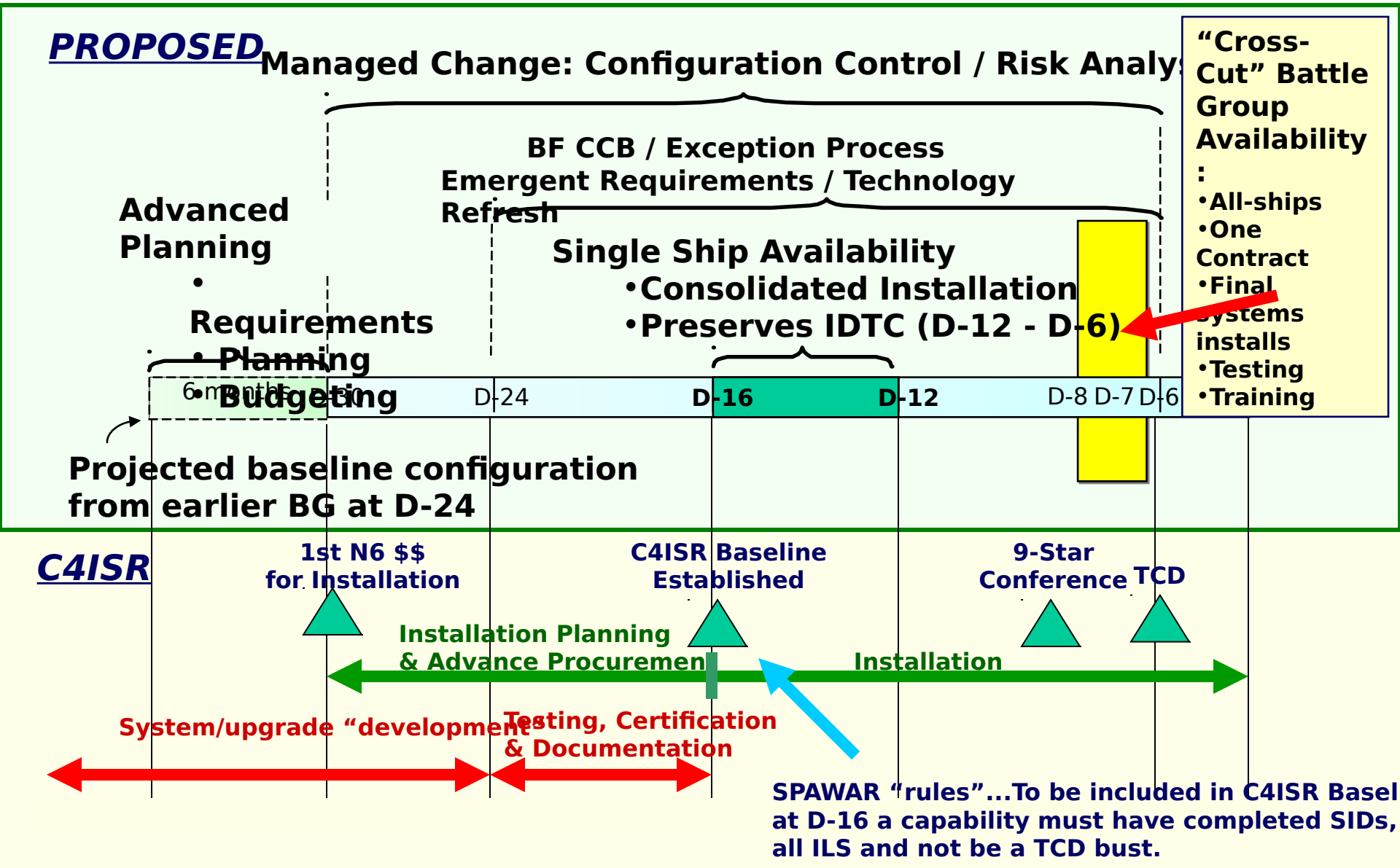
Development



Installation Timeline Alternatives



An All-inclusive Installation Timeline?



SAR/SIDS Notional Timeline

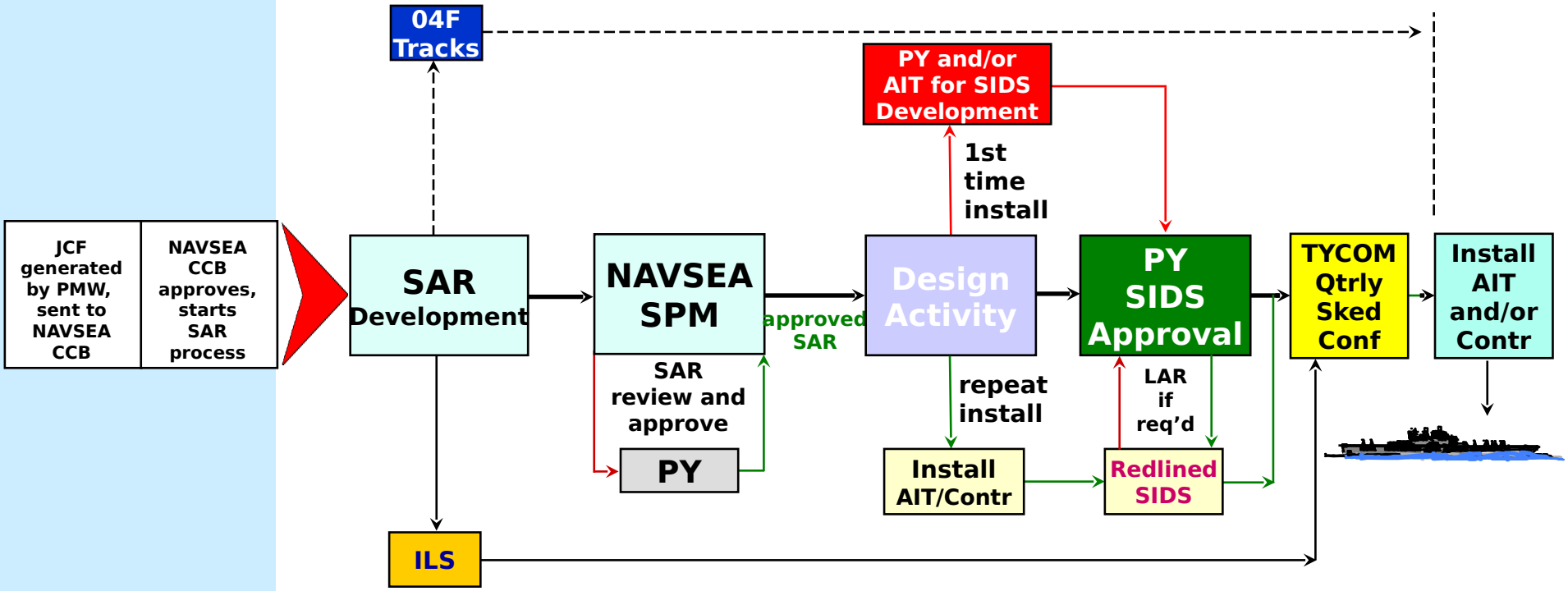
FIRST TIME ACCOMPLISHMENT

JCF: 30 days

SAR: 90-180 days

SIDs: 60-90 days

Sched: 30-120 days

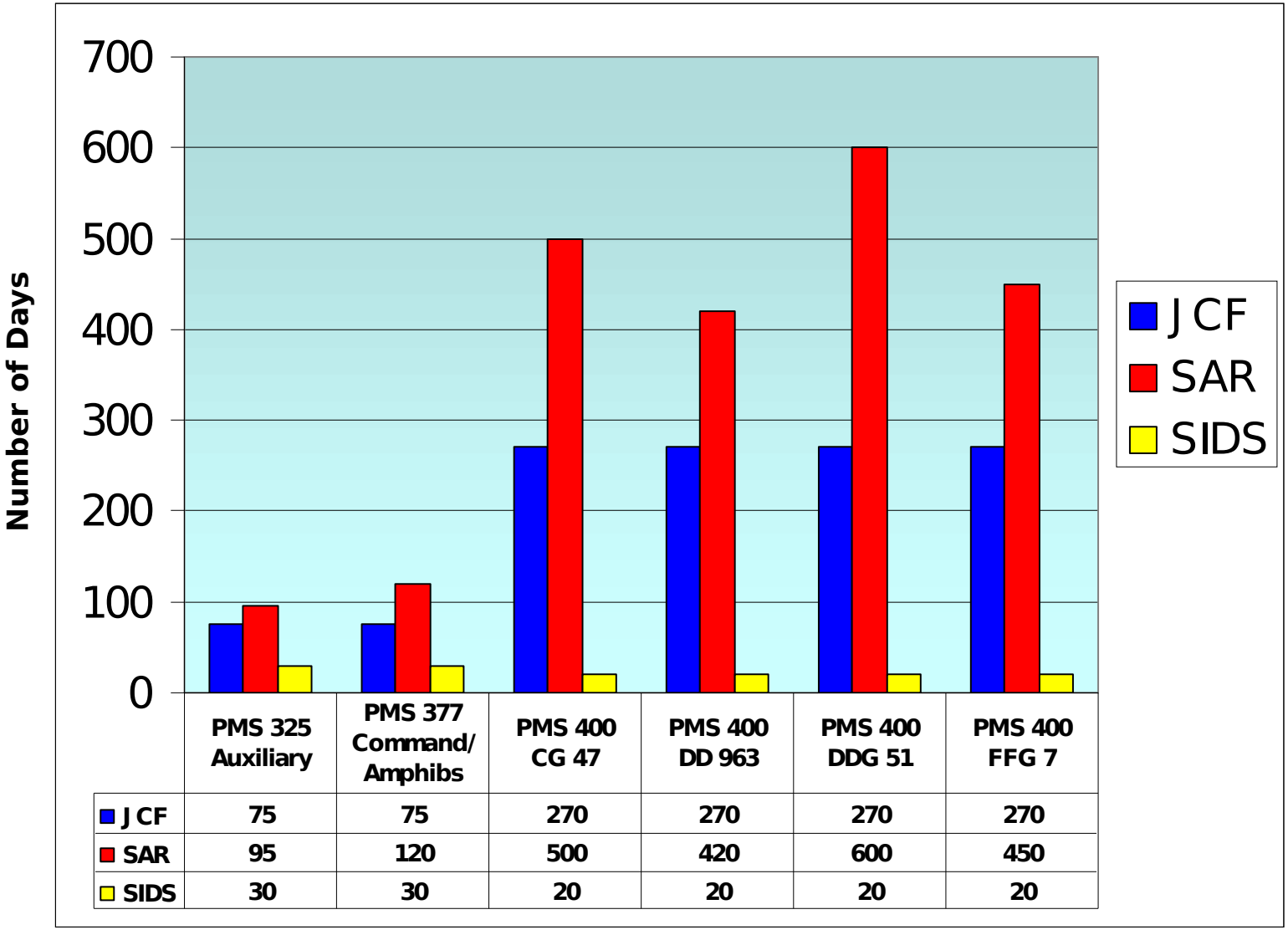


FOLLOW-ON ACCOMPLISHMENT

SIDs: 30-60 days

Sched: 30-120 days

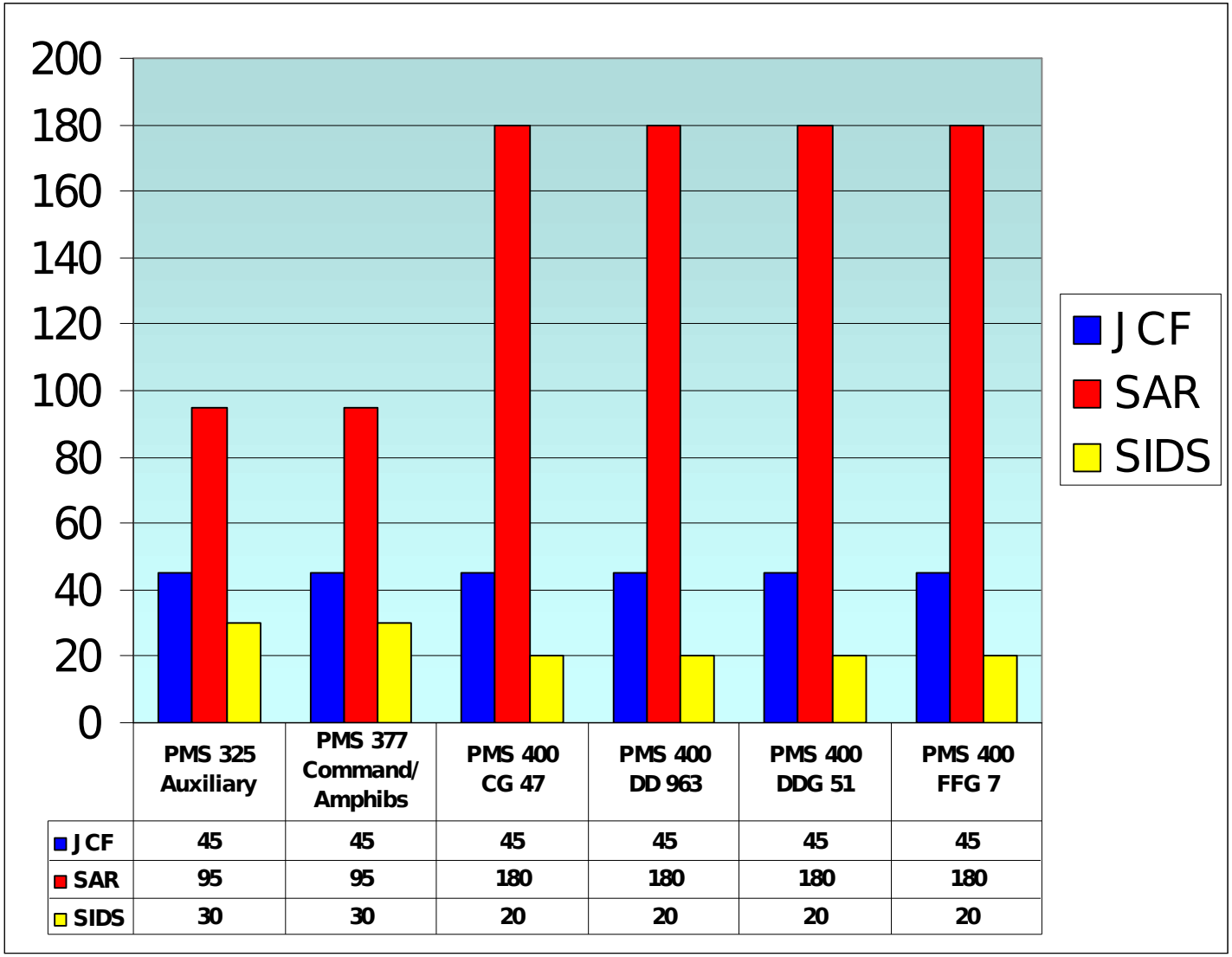
Documentation And Approval
(Before)



	PMS 325 Auxiliary	PMS 377 Command/ Amphibs	PMS 400 CG 47	PMS 400 DD 963	PMS 400 DDG 51	PMS 400 FFG 7
J CF	75	75	270	270	270	270
SAR	95	120	500	420	600	450
SIDS	30	30	20	20	20	20

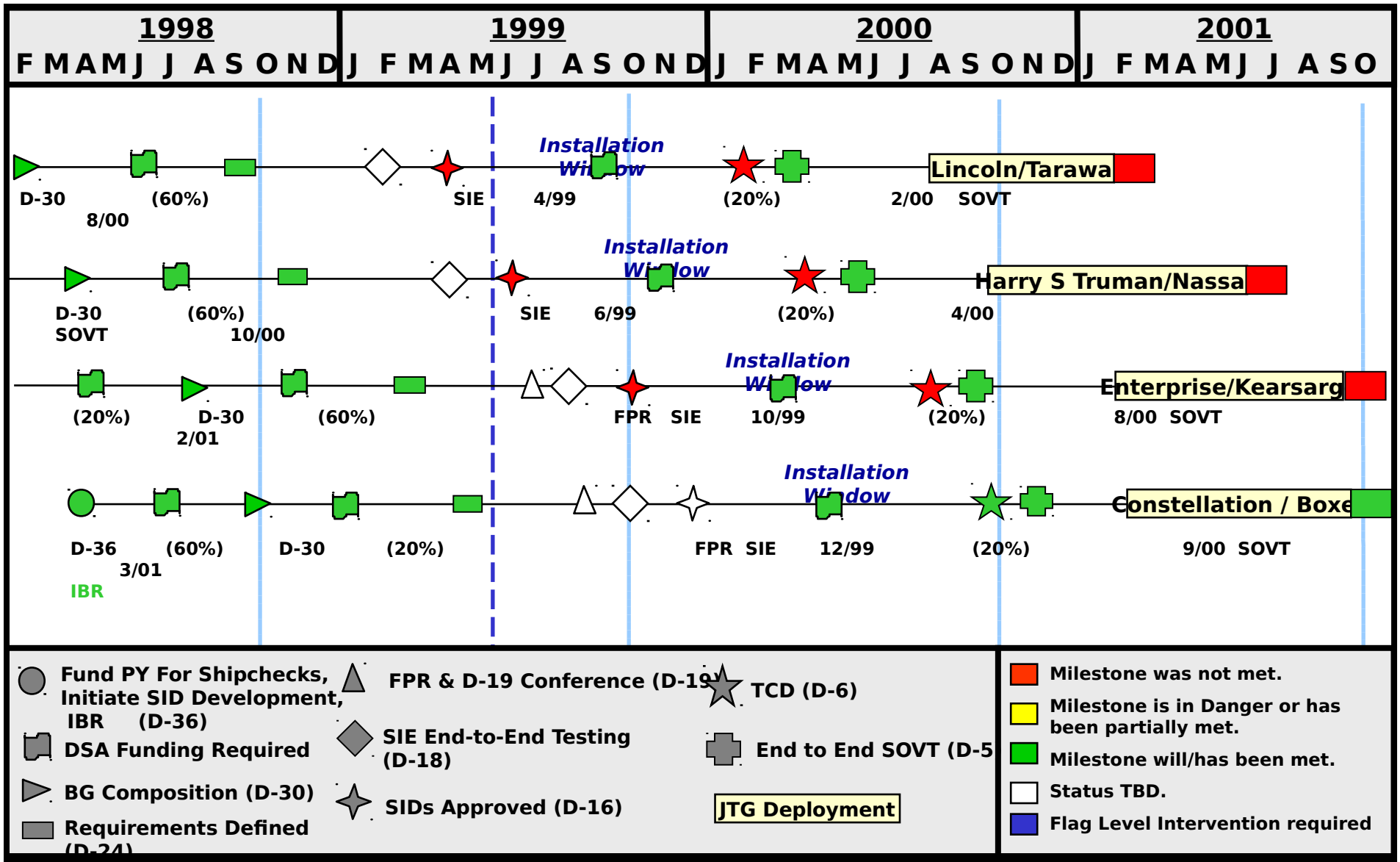
Documentation & Approval

(Current)

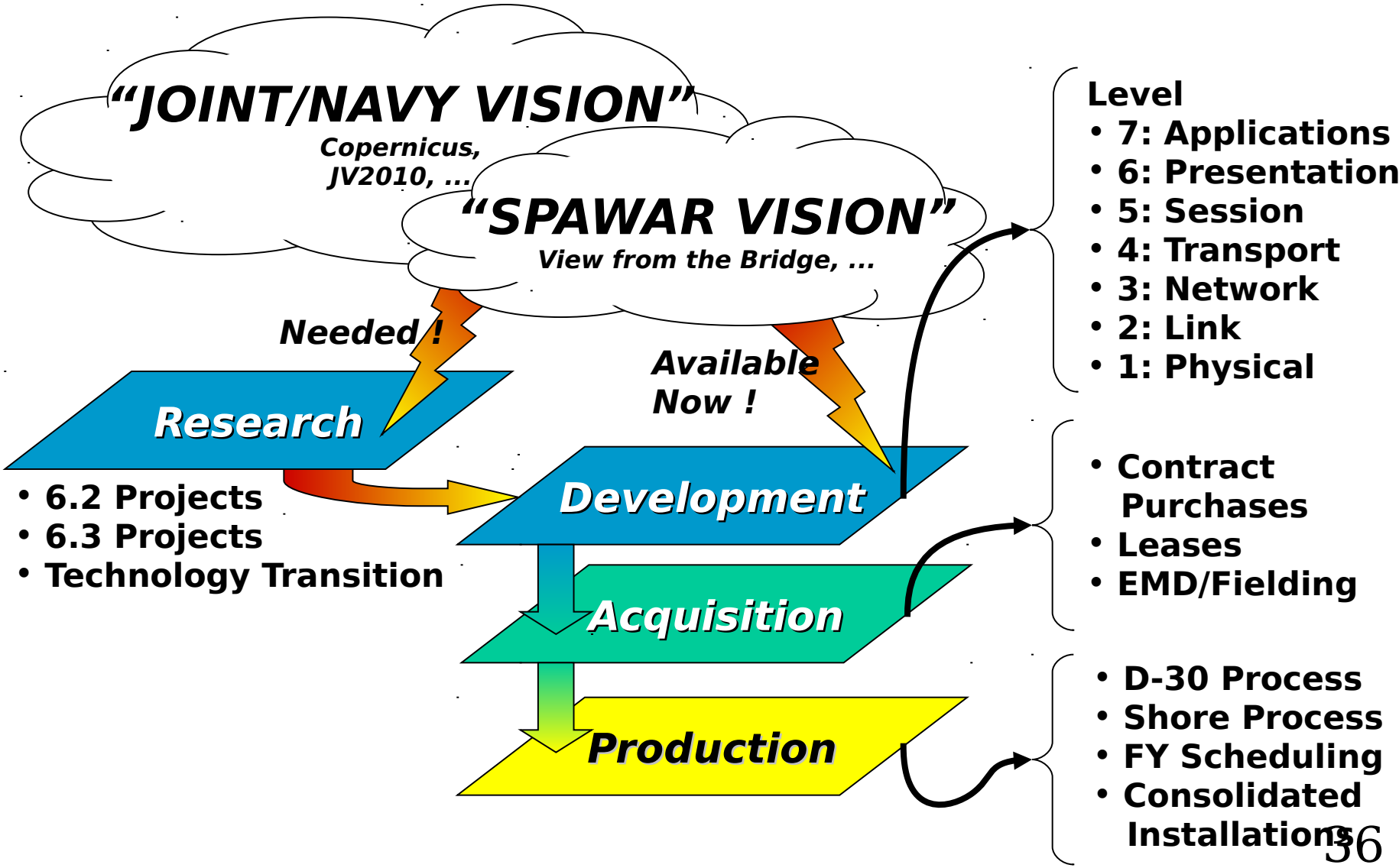


	PMS 325 Auxiliary	PMS 377 Command/ Amphibs	PMS 400 CG 47	PMS 400 DD 963	PMS 400 DDG 51	PMS 400 FFG 7
J CF	45	45	45	45	45	45
SAR	95	95	180	180	180	180
SIDS	30	30	20	20	20	20

Matching Funds & Capability to BG/ARG Schedules



SPAWAR Process Planes



Development Process

Research

Acquire and Produce

Requirements Analysis

Available Technology

Functional Analysis

Synthesized Design

Test Build

Final Build

Developmental Test(s)

Operational Test

FY Selection

Requirements Review

Functional Review

Design Review

Build Readiness Review

Test Readiness Reviews

Roughly a 2-year process
Build for FY 01 Installation

Execution

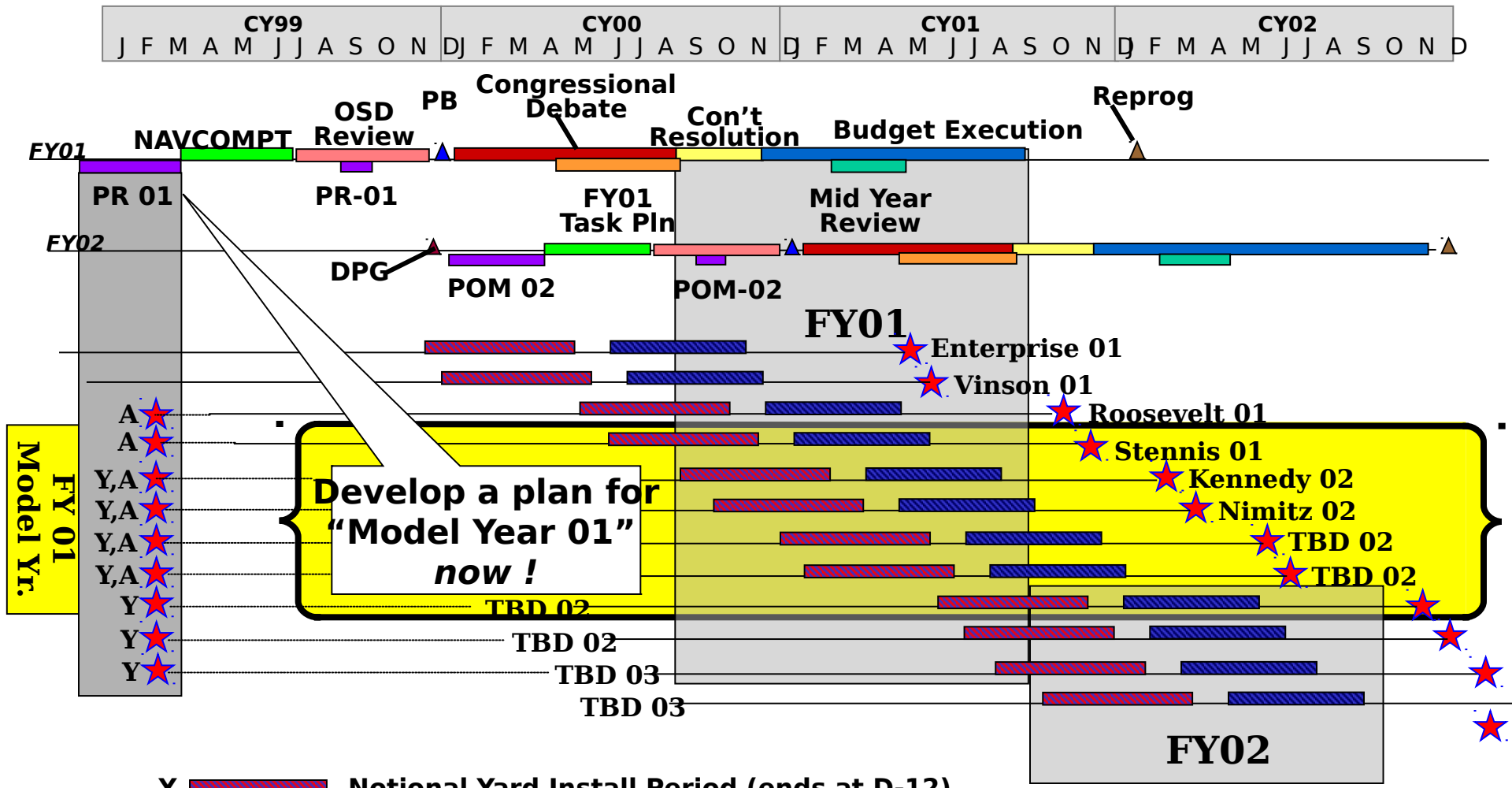
Reprogramming

FY01

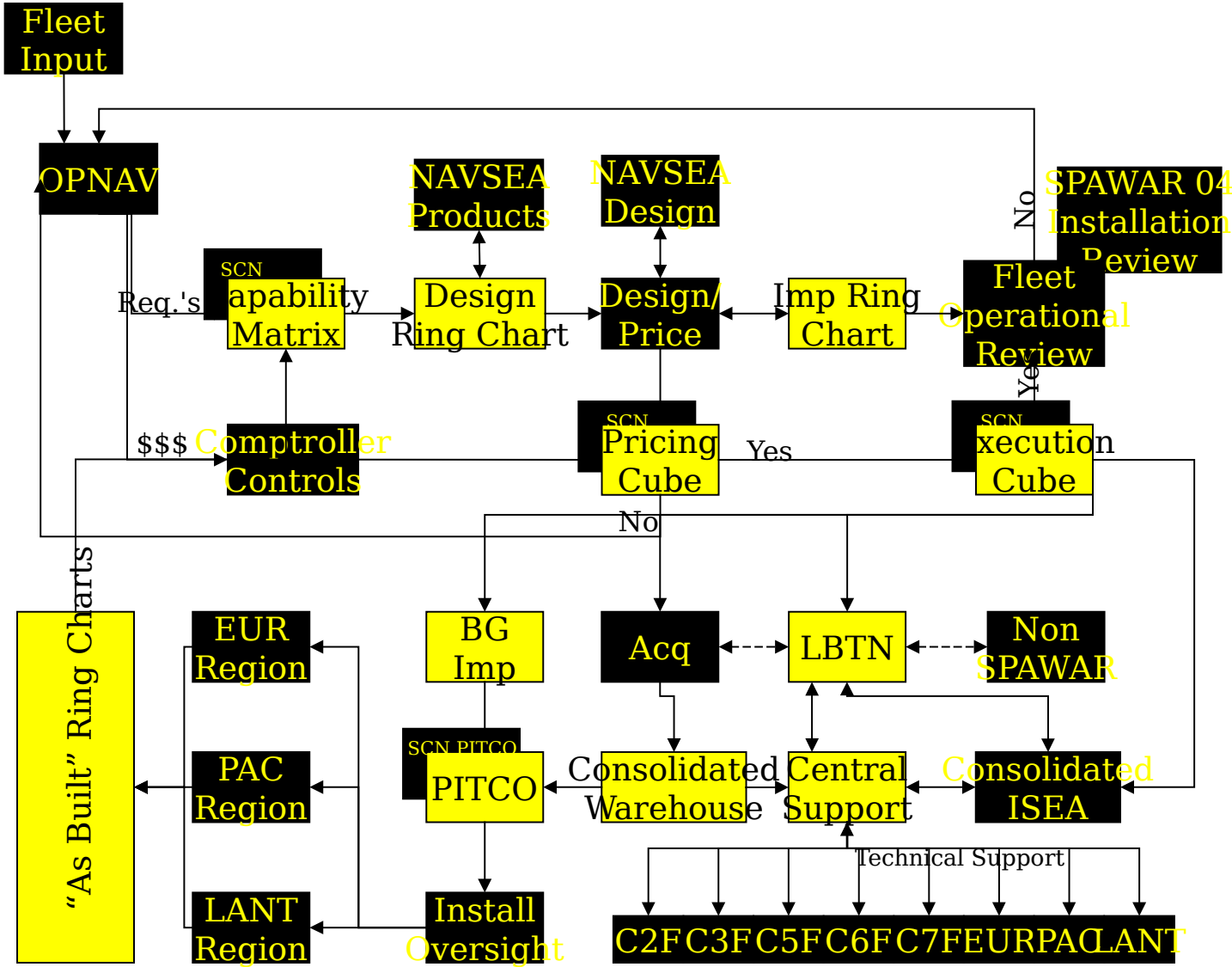
Mid Year Review

CY99												CY00												CY01												CY02											
J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

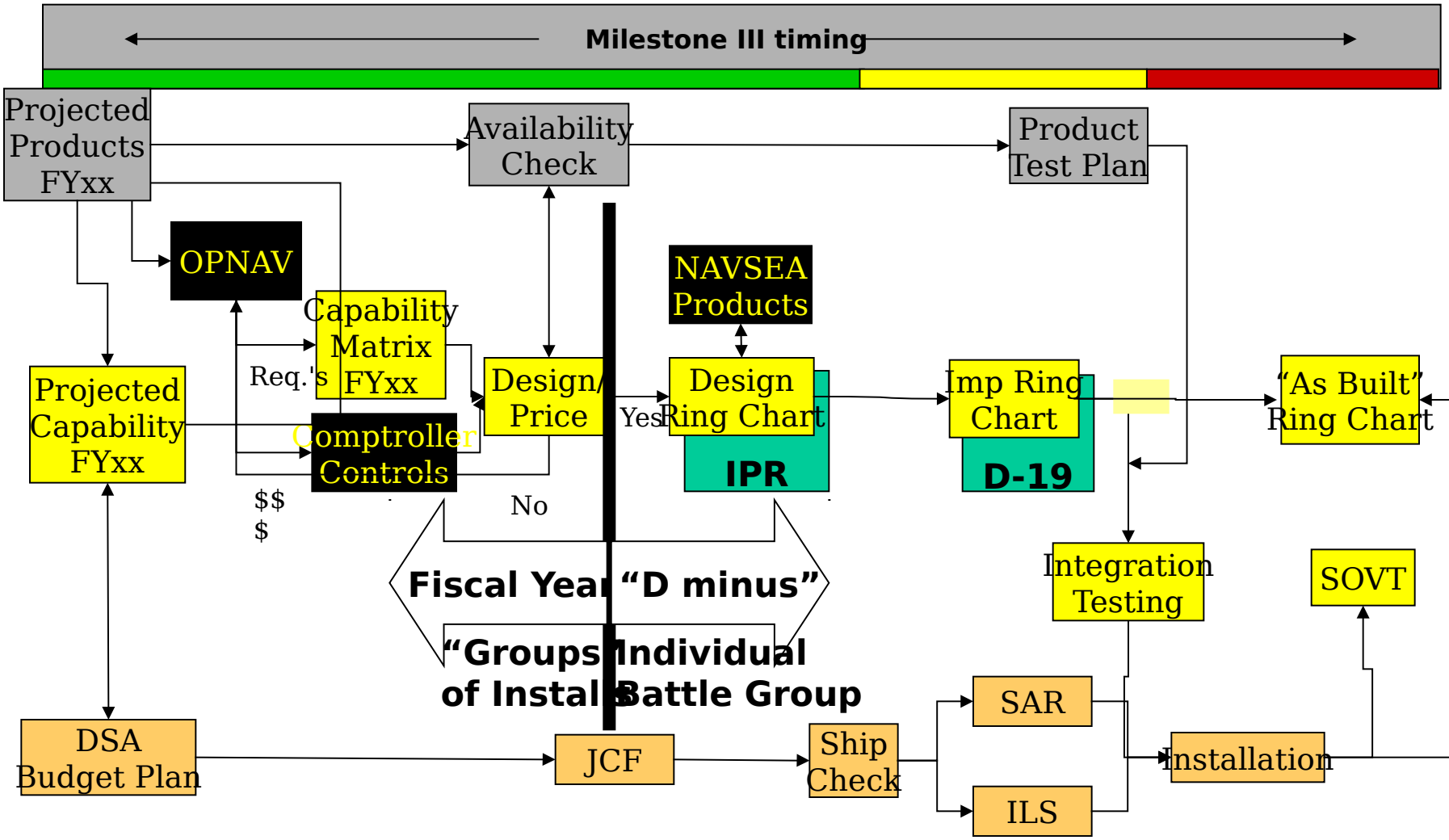
The "Model Year" Concept



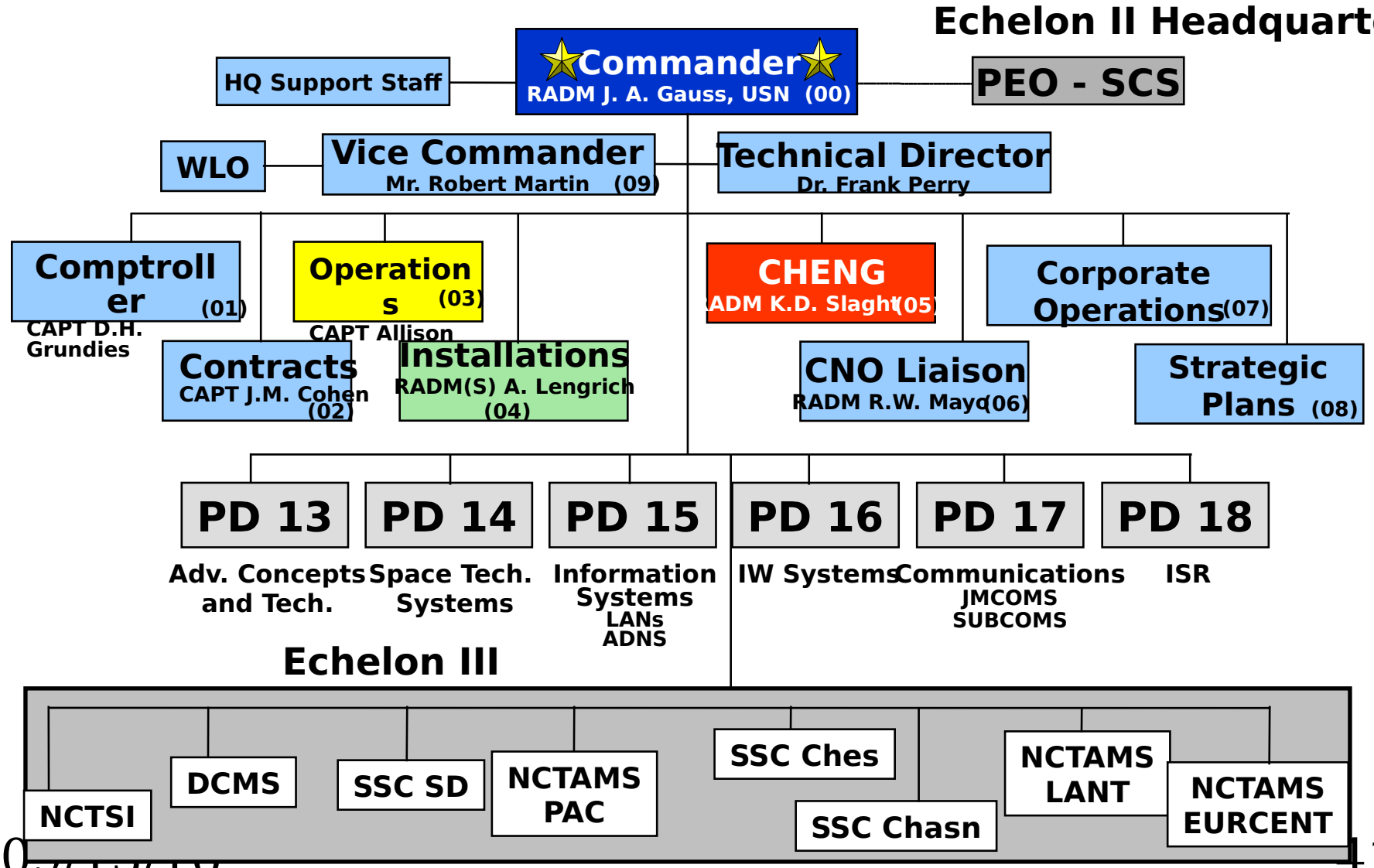
C4ISR "Production Process"



Production Process

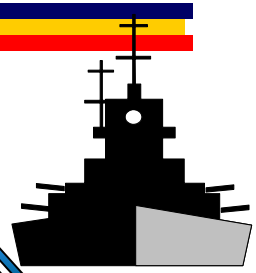


The C4ISR "Providers Coalition"



Summary

BG/ARG
needs/wants



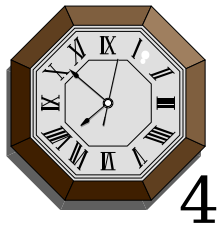
Ship
avails/skeds

C4ISR Modernization Today Is Closer To Shipbuilding Than Modernization…

Delivers end-to-end capability… not piece parts

Funding

Process
Timelines



In BG/ARG increments… not single ships

Last Slide

Whew!